Lecture Module - Introduction

ME3023 - Measurements in Mechanical Systems

Mechanical Engineering

Tennessee Technological University

Topic 1 - General Measurement System

Topic 1 - General Measurement System

- Welcome Back!

- Definition of a Measurement

- Measurement System Stages

- Brainstorming Activity

- Examples in Mechanical Engineering

Welcome Back!

Notes about class:

- These lecture notes can be found on ilearn under **Content** > **Lecture Modules**.

- The material will be organized in 10 to 15 min lectures. You are encouraged to ask questions.

- Lectures and most discussions will be recorded. You can watch them anytime.

- Lectures will be followed by a class activity to be submitted by the end of the class session.

Definition of a Measurement

"A _____is an act of assigning a specific value to a physical variable."

Text: Theory and Design of Mech. Meas.
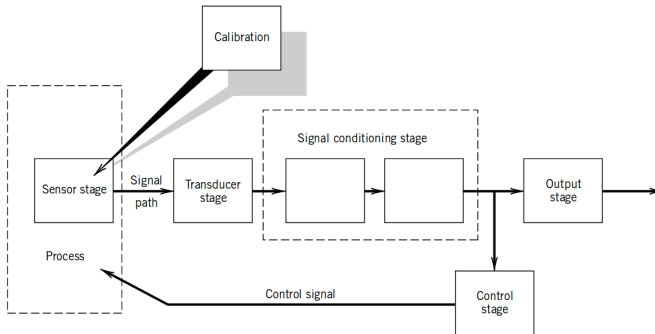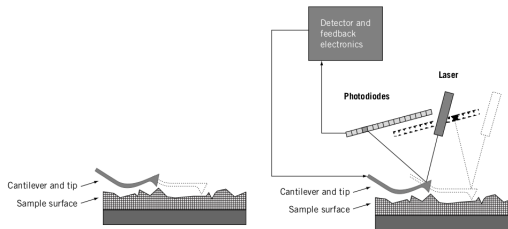
Measurement System Stages

Figure 1.5 Components of a general measurement system.

Image: Theory and Design of Mech. Meas.

Sensor-Transducer Stage

a _____, a physical element that employs some natural phenomenon... ...to sense the variable being measured
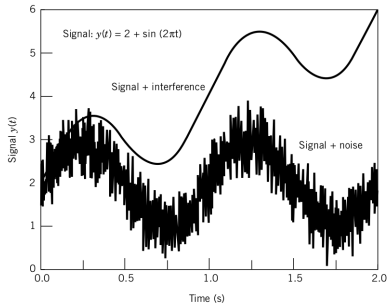

A transducer converts the sensed information into a

_____   _____

Text, Image: Theory and Design of Mech. Meas.

Signal Conditioning Stage

What is the the definition of signal?

- Filtering

- Amplification

- Attenuation

- Excitation

- Linearization

- Electrical Isolation

- Surge Protection

Image: Theory and Design of Mech. Meas.

Output Stage

The _____   _____indicates or records the
value measured. This might be a simple readout display, a marked
scale, or even a recording device such as a computer disk drive.

Image: Theory and Design of Mech. Meas.

Image: Wikipedia
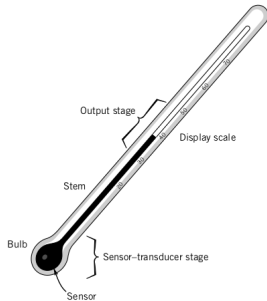
Brainstorming Activity

Activity: Team Brainstorm
Duration: ~ 10 minutes
Groups: 2-3 members

Topic: Remote Probe Concept

- You are designing a remote probe to inspect an environment which can only be accessed from above.

- The goal is to collect as much information as possible from the environment to prepare for a robotic maintinence task.

Requirements:

- Probe must enter environment through hole $\sim 100mm$ wide
- Probe must exit through same hole leaving nothing behind
- The alllowable EFI and RFI is limited. No wifi communication is available

Deliverable: Submit a copy of your team brainstorming notes including text, images, and diagrams to the activity assignment on ilearn. Include names of all team members.

Examples in Mechanical Engineering

IDETC2022-96785: Development of an Instrumented Rear Suspension to Measure the Tire Forces of a Race Car During Track Driving

Examples in Mechanical Engineering

IDETC2022-91154: Photometric Stereo Enhanced Light Sectioning Measurement for Microtexture Road Profiling

Examples in Mechanical Engineering

IDETC2022-90082: Automated Weld Path Generation Using Random Sample Consensus and Iterative Closest Point Workpiece Localization